Linolenic acid

Lipoxygenase

13-Hydroxylinoleic acid

Hydroperoxide lyase

12-oxo-(9Z)-dodecenoic acid   +   (3Z)-Hexenal

Alcohol dehydrogenase   Isomerazation

(3Z)-Hexenol   (2E)-Hexenal

Hydroperoxide Lyase Pathway

Figure 1

Citrullus lanatus Hydroperoxide Lyase Peptide Sequence

```
  1   Met Lys Val Thr Met Thr Ser Gly Gly Met Pro Ser Ile Pro Ser    15
 16   Ser Ile Ser Pro Pro Pro Val Thr Leu Pro Leu Arg Asn Ile Pro    30
 31   Gly Ser Tyr Gly Leu Pro Leu Phe Gly Ser Ile Gly Asp Arg Leu    45
 46   Asp Tyr Phe Trp Phe Gln Gly Pro Glu Lys Phe Phe Arg Ser Arg    60
 61   Met Glu Lys Asn Gln Ser Thr Val Phe Arg Thr Asn Val Pro Pro    75
 76   Ser Phe Pro Phe Phe Phe Thr Asp Pro Arg Val Ile Ala Val Leu    90
 91   Asp Cys Lys Ser Phe Ala His Leu Phe Asp Met Glu Ile Val Glu   105
106   Lys Lys Asn Val Leu Val Gly Asp Phe Met Pro Ser Thr Ser Phe   120
121   Thr Gly Asn Met Arg Val Cys Ala Tyr Leu Asp Thr Ser Glu Ser   135
136   Gln His Ser Lys Ile Lys Asn Phe Val Met Asp Val Leu Arg Arg   150
151   Ser Ser Arg Ile Trp Ile Gln Glu Leu Glu Ser Asn Leu Ser Thr   165
166   Met Trp Asp Ser Ile Glu Ser Glu Ile Ala Lys Asp Thr Lys Ser   180
181   Ser Phe Arg Asn His Leu Gln Pro Thr Leu Phe Asn Phe Phe Ser   195
196   Lys Thr Leu Ala Gly Ala Asp Thr Ala Lys Ser Pro Glu Val Ala   210
211   Lys Ser Gly Tyr Ile Asp Val Ile Ile Trp Leu Gly Leu Gln Leu   225
226   Val Pro Thr Ile His Ile Gly Ile Leu Gln Pro Leu Glu Glu Ile   240
241   Phe Leu His Ser Phe Arg Leu Pro Phe Phe Pro Ile Ala Ser Arg   255
256   Tyr Gln Arg Leu Tyr Asp Phe Ile Gln Lys Glu Gly Glu Glu Val   270
271   Val Glu Arg Gly Val Ser Glu Phe Gly Leu Thr Lys Asp Glu Ala   285
286   Ile His Asn Leu Ile Phe Thr Met Gly Phe Asn Ala Tyr Gly Gly   300
301   Phe Ser Leu Phe Phe Pro Val Leu Leu Asp Arg Ile Leu Asn Asp   315
316   Lys Thr Gly Leu Gln Gln Arg Ile Leu Glu Glu Val Lys Ala Lys   330
331   Thr Gly Ser Gly Leu Thr Phe Glu Ser Val Lys Glu Met Asp Leu   345
346   Ile Tyr Ser Val Val Tyr Glu Thr Leu Arg Leu Asp Pro Pro Val   360
361   Pro Thr Gln Tyr Ala Arg Ala Arg Lys Asp Phe Lys Leu Ser Ser   375
376   Tyr Asp Ser Ala Tyr Ser Ile Lys Lys Gly Glu Leu Leu Cys Gly   390
391   Tyr Gln Pro Leu Val Met Arg Asp Pro Lys Val Phe Asn Lys Pro   405
406   Lys Thr Phe Asn Pro Gly Arg Phe Arg Gly Glu Lys Gly Ala Ala   420
421   Leu Leu Asp Tyr Leu Phe Trp Ser Asn Gly Pro Gln Thr Gly Leu   435
436   Pro Ser Glu His Asn Lys Gln Cys Ala Gly Lys Asp Leu Val Val   450
451   Leu Thr Ala Val Val Phe Val Ala Tyr Ile Phe Arg Arg Tyr Asp   465
466   Trp Ile Ala Gly Glu Gly Gly Ser Ile Thr Ala Phe Gln Arg Thr   480
481   Asn                                                            481
```

Figure 2

Citrullus lanatus Hydroperoxide Lyase Nucleotide Sequence

```
   1  ATGAAGGTCACCATGACCTCCGGCGGAATGCCTTCCATACCTTCATCGATTTCGCCACCG    60
  61  CCGGTCACTTTACCGCTCAGAAATATCCCCGGCAGCTACGGTTTGCCGCTGTTCGGATCC   120
 121  ATCGGTGACCGGCTGGATTACTTCTGGTTTCAAGGACCCGAGAAGTTCTTCAGGTCTCGG   180
 181  ATGGAGAAGAATCAAAGTACGGTTTTCAGAACGAATGTTCCTCCGTCGTTCCCTTTCTTC   240
 241  TTCACCGATCCGAGAGTGATTGCGGTTCTGGATTGCAAGTCGTTTGCGCATCTATTCGAC   300
 301  ATGGAAATCGTGGAGAAGAAGAATGTTCTGGTCGGTGATTTCATGCCGAGCACAAGTTTC   360
 361  ACCGGAAATATGAGAGTCTGTGCGTATTTGGATACGTCGGAATCTCAACACTCGAAGATA   420
 421  AAAAACTTCGTCATGGACGTTCTGCGGCGGAGCTCGAGGATTTGGATACAGGAGTTGGAA   480
 481  TCGAACCTATCGACCATGTGGGACAGCATAGAATCCGAAATCGCAAAGGACACAAAATCC   540
 541  AGCTTCAGAAACCATCTCCAACCAACTCTTTTCAATTTCTTCTCCAAAACCCTGGCCGGC   600
 601  GCCGACACTGCAAAATCACCGGAAGTGGCTAAATCCGGCTACATCGACGTCATAATTTGG   660
 661  CTGGGGCTCCAGCTGGTCCCCACCATCCACATCGGCATTCTCCAACCCCTGGAAGAAATA   720
 721  TTCCTCCACTCTTTCCGATTACCCTTCTTCCCCATCGCCTCTCGCTACCAAAGACTCTAC   780
 781  GATTTCATCCAAAAAGAAGGGGAAGAAGTGGTTGAGCGAGGCGTTTCGGAGTTCGGGTTG   840
 841  AGGAAGGATGAAGCAATTCACAATCTCATCTTCACCATGGGATTCAACGCCTACGGTGGT   900
 901  TTCAGTCTCTTCTTCCCGGTTCTACTCGATCGGATACTCAACGACAAAACCGGTTTACAA   960
 961  CAGAGAATCCTCGAGGAAGTCAAGGCAAAAACCGGCTCCGGTCTGACATTCGAGTCGGTC  1020
1021  AAGGAGATGGATCTCATCTACTCCGTCGTTTACGAGACACTCCGGCTTGACCCGCCGGTT  1080
1081  CCAACCCAGTACGCGAGAGCCAGAAAGGATTTCAAGCTAAGTTCCTACGATTCAGCGTAT  1140
1141  AGCATCAAGAAAGGGGAGCTGCTTTGTGGGTATCAGCCGCTGGTGATGAGAGACCCGAAG  1200
1201  GTGTTCAATAAACCGAAGACGTTTAATCCGGGCCGGTTCCGGGGAGAGAAGGGGGCGGCG  1260
1261  CTGCTGGATTATTTGTTCTGGTCGAACGGGCCGCAGACGGGACTACCGAGCGAGCATAAC  1320
1321  AAGCAGTGCGCCGGGAAGGATTTGGTGGTGCTGACGGCAGTGGTGTTCGTGGCTTACATA  1380
1381  TTTCGAAGGTATGATTGGATTGCAGGGGAAGGAGGTTCGATTACAGCTTTTCAAAGGACC  1440
1441  AACTGAAGTGAAATATATATATATGTAGATTGAGAACTGCAGCTTTTTTTGTTCATGG  1500
1501  CTTCTTTTTTATGTATGAGTGTGGAGCCCAAATGAAAAAAATTGGAAAAATTAATCAATA  1561
1561  AAATTAAGATTCCATTTAAAAAAAAAAAAAAAAAAAAAAAAGCAAAAAAAAAAAAAAAAAA  1620
1621  AAAAAAAAAAA                                                   1632
```
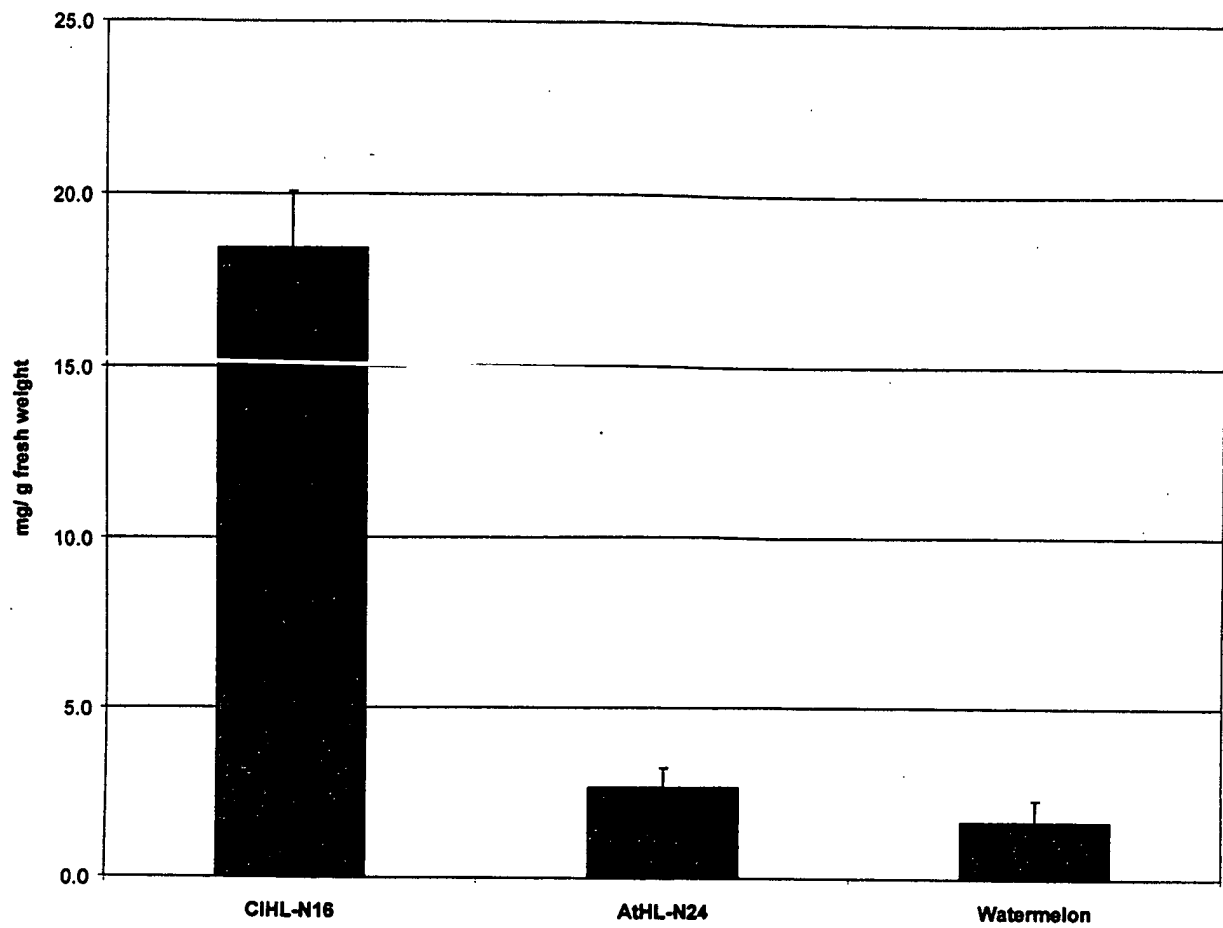
Figure 3

CIHL-N16: Watermelon HL transgenic tobacco

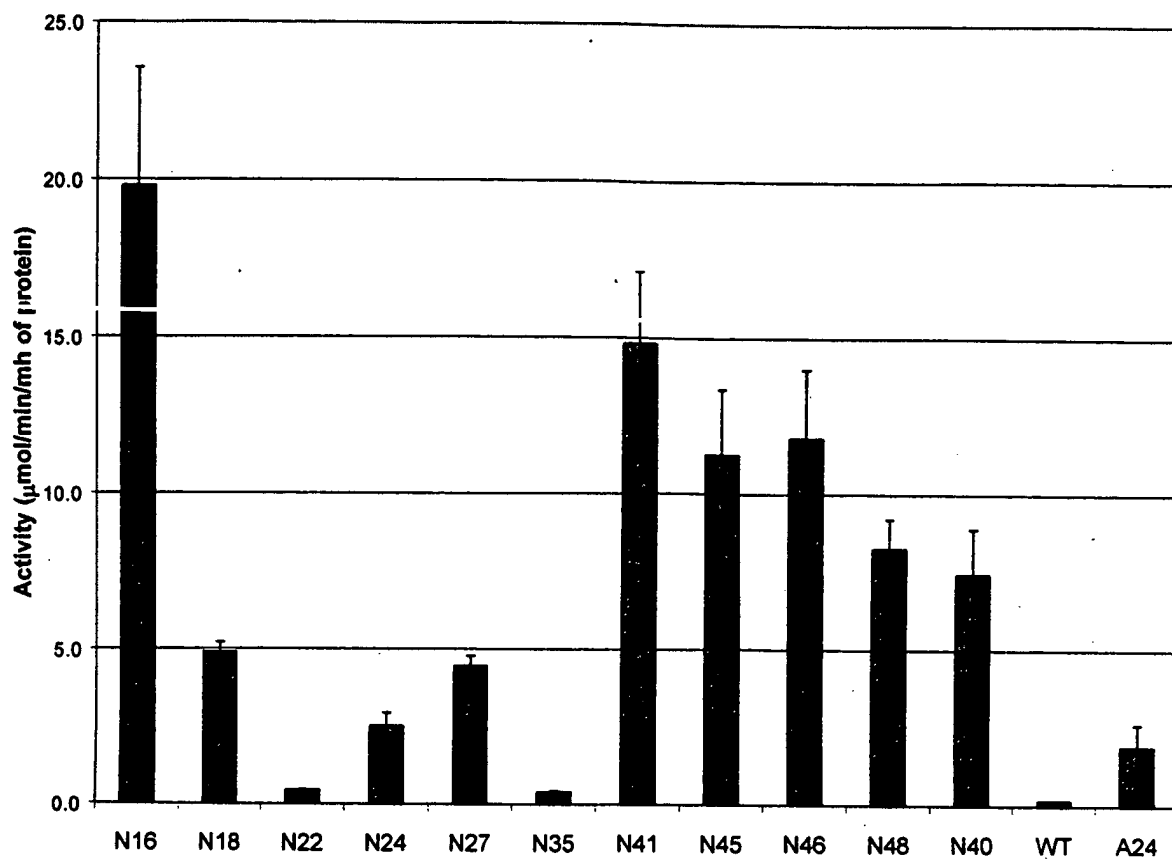AtHL-N24: Arabidopsis HL transgenic tobacco

Figure 4

Figure 5